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John P. Musone
Siemens Corporation
Intellectual Property Department
170 Wood Avenue South
Iselin, NJ 08830

EXAMINER	
MALEKZADEH, SEYED MASOUD	
ART UNIT	PAPER NUMBER
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/541,691	BOSTANJOGLO ET AL.	
	Examiner	Art Unit	
	SEYED M. MALEKZADEH	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-16 and 18-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-16 and 18-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Claims 11-16 and 18-26 are pending.

Claim 17 is cancelled.

In view of the amendment, filed on 02/27/2008, following rejections are withdrawn from the previous office action, mailed on 11/27/2007, for the reason of record.

- Rejection of claims 22-24 under 35 U.S.C. 112, second paragraph
- Rejection of claims 22-24 under 35 U.S.C. 102(b) as being anticipated by Kear et al. (US4,250,229)
- Rejection of claim 17 under 35 U.S.C. 103(a) as being unpatentable over Kurz et al (US 6,024,792) in view of Kear et al (US 4,250,229)

Following rejections are maintained for the reason of records as given in the previous office action, mailed on 11/27/2007. The bases of these rejections are the same as given in previous office action.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 11-15, 18-21, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurz et al (US 6,024,792) in view of Kear et al (US 4,250,229)

Kurz et al ('792) disclose a method for producing a single crystalline structure from metallic super-alloys by providing a single crystalline substrate, which includes a crystal orientation, and epitaxially growing a plurality of layers material via an epitaxial method called as a first material application process to provide a single crystal build up layer. Furthermore, Kurz et al ('792) teach applying one or more mono-crystalline layers epitaxially over the surface of the substrate to build up one or more group of layers. (See lines 58-67 column 1; lines 1-33 column 2). As it was pointed out, Kurz et al ('792) teach epitaxially growth of the layer materials with one or more layers, in which one of the middle layers can be considered as an intermediate layer. Furthermore other single crystalline layers are also grown epitaxially over the intermediate layer to build up a plurality of single crystalline layers over the surface of the considered intermediate layer. (See lines 62-67, column 1) It is noted that mono-crystalline structure is as the same as single crystal structure.

Kurz et al ('792) also teach the method provides the capability of reconditioning damaged and worn single crystal workpieces to supplement and newly build up the ideal crystal structure. In this method, the substrate such as a monocrystalline turbine blade is built up and further developed mono-

crystallinically layer by layer until the original size and shape of the workpiece has been achieved. (See lines 12-23, column 2)

Kurz et al ('792) further teach the substrate includes a plurality of single-crystalline layer structure from the epitaxial growth of the layer material. (See lines 22-48, column 2)

Furthermore, Kurz et al ('792) discloses the produced crystalline structure is subsequently annealed to low internal stresses preferably at a temperature in the range from 1000° C. to 1250° C. (See lines 10-17, column 3) Therefore, Kurz et al ('792) teach a heat treatment transforming at least part of the intermediate layer with the substrate and layer material into a region having a crystalline structure. (See lines 10-32, column 3)

Kurz et al ('792) also teach to build up on the directionally solidified structure of a substrate, one or more layers or a body or a workpiece with the same directionally solidified structure as the substrate in which this growth method is an epitaxial growth method; (See lines 62-67, column 1) Therefore, Kurz et al ('792) teach the considered intermediate layer is applied within the layers structure component via an epitaxial growth process.

Furthermore, since the composition of the intermediate layer and the substrate and the other layers of the component are the same (See lines 23-48 and 64-67 column 2 and lines 1-10, column 3); therefore, Kurz et al ('792) teach the composition and the composition ratios of constituents for the intermediate layer are adapted to a main composition ratio of the main

constituents of the substrate. (See lines 23-48 and 64-67 column 2 and lines 1-10, column 3)

Moreover, Kurz et al ('792) teach a process to build up on the directionally solidified structure of a substrate, one or more layers, or a body or a work-piece with the same directionally solidified structure as the substrate. (See lines 58-67, column 1; and lines 21-33, column 3) in such a way that one of the middle layers within the epitaxially grown layers was considered as an intermediate layer and hence, the top layer deposited over the intermediate layer is considered as a single crystal over-layer applied by an epitaxial growth process considered as a first material application process.

Therefore, Kurz et al ('792) disclose depositing a single crystal material over layer made by epitaxial growth of a layer applied by a first material application process, and furthermore, Kurz et al ('792) teach an intermediate layer is applied to the substrate prior to the deposition of the over-layer.

Kurz et al ('792) also teach laser beams, electron beams and also arc methods such as e.g. Micro-TIG or plasma methods are suitable as the energy or heat source for carrying out the method (See lines 1-7, column 6); therefore, Kurz et al ('792) teach the intermediate layer is applied by a deposition process.

However, Kurz et al ('792) do not teach the intermediate layer includes a non-single crystal or non-directionally grown structure, as claimed in claims 11 and 25, and also the prior art does not teach the single crystal buildup layer being isolated from the crystal orientation of the substrate by the intermediate

layer, as claimed in claim 11; moreover, the intermediate layer is applied via a second material application process, as claimed in claims 19 and 25.

In the analogous art, Kear et al. ('229) disclose a method for brazing and bonding two metal work-pieces wherein the process includes the step of providing an interlayer foil for brazing and diffusion bonding of the work-pieces in such a way that the interlayer foil includes an amorphous metal structure to produce an improved brazed or diffusion bonded structure between the work pieces. (See abstract and lines 29-36, column 3) It is noted that an amorphous metal structure is, inherently, a non-single crystalline and non-directional structure. Therefore, Kear et al. ('229) teach the interlayer has an amorphous structure which is neither a single crystal nor directional structure on the substrate. Also Kear et al ('229) teach the amorphous metals are formed by methods such as rapid quenching of liquid metals and physical or chemical depositions. (See lines 40-45, column 2) Therefore, the prior art teaches the intermediate layer is applied via a second application process.

Moreover, Kear et al. ('229) teach the usefulness of the process for the joining of the cast single crystal superalloys; In such a way that the crystal structures of the workpieces are aligned and the amorphous interlayer is interposed and the diffusion bonding process is carried out. Furthermore, it will be found that a single crystal joined assembly will be the result from the epitaxial solidification. (See lines 65-68, column 9 and lines 1-10, column 10)

Therefore, the prior art teaches the single crystal buildup layer being isolated from the crystal orientation of the substrate by the intermediate layer.

Furthermore, Kear et al. ('229) teach the advantages of applying an interlayer foil with an amorphous structure within joint of the work-pieces in order to improve the brazed or diffusion bonded structure of the epitaxially grown layered component, and further to improve a method of brazing and bonding two crystalline work-pieces. (See lines 25-36, column 3)

Therefore**,** It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kurz et al. ('792) by providing a non single-crystal or non-directional structure intermediate layer which isolates the single crystal build up layer from the crystal orientation of the substrate and applying the intermediate layer via a second application process in order to provide an improve diffusion bonding within the build up layers and the single crystalline substrate of the workpiece, as suggested by Kear et al ('229).

Claims 16 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurz et al. ('792) and Kear et al. ('229) as applied to claims 11-15, 18-21, and 25 and further in view of Caballero (US 5,213,907).

Combined teaching of Kurz et al ('792) and Kear et al ('229) disclose all the process limitations of a process for producing single–crystal structure from metallic superalloys as discussed above; however, fail to teach the intermediate

layer is generated by an electrochemical process, as claimed in claim 16, or by an electro-deposition process, as claimed in claim 26.

In the analogous art, Caballero et al. ('907) discloses epitaxial deposition of a metal alloy such as Ni-B, Co-B, Ni-Co, Ni-Fe, Co-Fe, Ni-Co-Fe which are comparable with intermediate layer by an electrochemical process on a surface of a substrate. (See lines 14-23, column 2)

Also, Caballero ('907) teaches a method of electrodepositing metal alloys which causes the alloy to diffuse into the surface of a substrate and chemically bond to the substrate at the interface between the alloy and the substrate (See lines 28-34, column 2). Furthermore, Caballero ('907) teaches the metal alloy, which is deposited by the electrodepositing method is dense, hard, ductile and highly reflective (See lines 21-25, column 2)

Also, Caballero et al. ('907) teach the advantages of employing an electro-chemical or electro-deposition process for the layer's deposition in order to improve the complexity of the deposition process in which the layers can be deposited quickly and easily. (See lines 37-41, column 2)

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify combined teachings of Kurz et al. ('792) and Kear et al ('229) by generating an intermediate layer through an electro-chemical or electro-deposition process in order to apply deposition process of intermediate layer quicker and easier, as suggested by Caballero ('907).

New Grounds of Rejection

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11-16 and 18-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With regard to claim 11, claim recites in lines 4-5, "the substrate comprising at least one undesirable crystal orientation", and also, in lines 9-10, the claim recites "at least one undesirable crystal orientation of the substrate by the intermediate layer", wherein, in these citations, the term "undesirable" is not defined by the claim, and one of ordinary skill in the art would not be reasonably apprised the scope of the "undesirable crystal orientation". Therefore, the claim fails to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole

> would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 22-24 are rejected under 35 U.S.C 103(a) as being unpatentable over Esch et al. (US 6,331,361) in view of Kear et al. (US 4,250,229)

Esch et al. (361) teach a component composed of equiaxed cast or wrought alloys wherein the component is composed of a section of equiaxed cast or wrought alloys and at least one section composed of directionally solidified or single crystal material joined thereto with a filler material disposed there-between. (See lines 9-18, column 4) Furthermore, Esch et al. (361) disclose the composite component include one or more directionally solidified or single crystal inserts in the critical areas to improve the overall performance of the part. The prior art also teaches the welding layers (7) as an intermediate layer join a leading (3) and a trailing (2) with a vane (4) wherein each of the leading (3) , the trailing (2) and the vane (4) have a super-alloy composition and a single crystalline structure. (See lines 10-29, column 3) Therefore, Esch et al. (361) teach a component comprising of a vane (4) as a substrate having a

single-crystalline structure, a welding layer (7) as an intermediate layer, and a leading (3) or a trailing (2) as a third layer material with a single crystal structure positioned on the intermediate layer (7) wherein the composition of the layer material at least approximately correspond to a material composition of the substrate.

However, Esch et al (361) is silent to teach that the intermediate layer include a non-single crystal or non-directionally structure, as claimed in claim 22.

In the analogous art, Kear et al ('229) disclose a metallic work-piece layer component in which includes a crystalline portion (12b), as a substrate, and two amorphous metal structure interlayers (10a) and (10b), as intermediate layers. (See lines 38-41 column 8 and figures 1-2). Moreover,Kear et al ('229) teach that two amorphous metal structure interlayer (10a) and (10b) are diffusion bonded and brazed to the single crystalline portion (12b). (See abstract and lines 29-36, column 3; lines 65-68 column 9, and lines 1-10 column 10; also lines 3-6, column 14; and figure 2)

Moreover, Kear et al ('229) teach the amorphous metals are formed by methods such as rapid quenching of liquid metals and physical or chemical deposition. (See lines 40-45, column 2)

Furthermore, Kear et al. ('229) teaches the advantages of providing an interlayer foil with an amorphous structure to join work-pieces in order to

improve the brazed or diffusion bonding of layered component. (See lines 25-36, column 3)

Therefore**,** It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to modify the component of Esch et al (361) by providing a non single-crystalline or non-directional structure intermediate layer for the joined work-pieces in order to improve the brazed or diffusion bonding of the layered components, as suggested by Kear et al ('229).

In regard to the limitation of claim 24, "wherein the intermediate layer is generated electrochemically", the claim is drawn to a component product and no patentable weight is given to the process of forming the product, as recited in the MPEP (See MPEP 2113[R-1]), the determination of the patentability for the product is based on the product itself. The patentability of a product does not depend on its method of production. If the product, in the product-by-process claim, is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. Therefore, claim 24 is also rejected over the combination teachings of Esch et al. ("361) in view of Kear et al ('229).

Response to Arguments

Applicant's arguments with respect to claims 22-24 have been considered but are moot in view of the new ground(s) of rejection.

In regards to rejection of claims 11-15, 18-21, and 25 over combination teachings of Kurz et al ('792) in view of Kear et al ('229), applicants argue that the entire teaching of Kurz concerns depositing a layer of material (43) on a substrate (41) in such a way that the layer assumes the crystal structure of the underlying substrate. This is just the opposite of the teachings by Kear et al ('229), where the amorphous layer (10) or (10a and 10b) is purposefully deposited to be different than the crystalline layer (12) because Kear desires a benefit derived from the amorphous nature of the layer (10) or (10a) and (10b). Thus, the teaching of Kurz would destroy the functionality of the Kear invention, and their combination is inappropriate, and also applicants argue that if one to combine the teachings of Kurtz and Kear, the resulting combination fail to include the limitations of the independent claims 11 or 25.

However, this is not found persuasive because as to claims 11 and 25, Kurz ('792) teach a process for producing single crystal structure from metallic superalloys wherein one or more layers or a body or a workpiece grow, epitaxially, over the substrate. As cited in the body of the above rejection, one of the middle layers can be considered as an intermediate layer in which the other single crystalline layers are grown epitaxially over the intermediate layer to build up a plurality of single crystalline layers over the surface of the considered intermediate layer.

Moreover, Kear et al. ('229) disclose a method for brazing and bonding two metal work-pieces wherein the process includes the step of providing an

interlayer for brazing and diffusion bonding of the work-pieces wherein the interlayer foil includes an amorphous metal structure and produces an improved brazed or diffusion bonded structure between the work pieces (See abstract and lines 29-36, column 3) Also, Kear et al. ('229) teach the usefulness of the process for the joining of the cast single crystal superalloys; In such a way that the crystal structure of the workpieces are aligned and the amorphous interlayer is interposed and the diffusion bonding process is carried out. Furthermore, it will be found that a single crystal joined assembly will be the result from the epitaxial solidification. (See lines 65-68, column 9 and lines 1-10, column 10)

Therefore, the teachings Kurz ('792) and Kear et al. ('229) are within the same technology because both provide a method of producing a single-crystalline component structure from metallic super-alloys through epitaxial growth of the layers, therefore, the combination of Kurz et al ('792) and Kear et al ('229) references is proper; and further since Kear et al ('229) provide the advantages of applying an interlayer with an amorphous structure within joint surfaces of the single crystalline work-pieces (See lines 25-36, column 3); therefore, Kear et al ('229) teach a strong motivation for modifying the process of Kurz et al. ('792) through providing a non single-crystal or non-directional structure intermediate layer.

Furthermore, applicants argue that the independent claim 11 requires the step of applying an intermediate layer having no single-crystal or

directional structure onto a single-crystal substrate. If one were to use the method of Kurz to apply an intermediate layer of material to the claimed single crystal substrate, the result would be a single crystal intermediate layer, which teaches away from claim 11.

This is not found persuasive because, however, the intermediate layer of Kurz et al teaches a single crystalline structure, but applicants attention is drawn to the point that the teachings of Kear et al, which has been used to combine with Kurz, include a single crystalline workpiece component with an interlayer foil having an amorphous layer grown through the epitaxial growth process. Therefore, it would have been obvious to employ method of Kurz et al to produce a single crystalline component layers in view of the method of Kear et al to apply an intermediate non-single crystalline and non-directional layer within the single crystalline component structure layers.

Moreover, applicants argue that the limitation that the substrate comprises at least one undesirable crystal orientation, and the single crystal build up layer is isolated from the at least one undesirable crystal orientation of the substrate by the intermediate layer. Kear teaches away from this limitation because at column 9, lines 65 through column 10, line 8, prior art teaches that his interlayer changes its crystal orientation when used between two single crystal work pieces when they are joined to form a structure having a single crystal structure extending across the joint region.

This is not found persuasive because kear does not teach the interlayer adapts the crystal orientation of single crystalline work pieces. Therefore, the single crystal build up layer being isolated from the at least crystal orientation of the substrate by the intermediate layer. Furthermore, the scope of the term undesirable has not been defined in the claims.

Therefore, rejection of claims 11-16 and 18-24 are maintained.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Masoud Malekzadeh whose telephone number is 571-272-6215. The examiner can normally be reached on Monday – Friday at 8:30 am – 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven P. Griffin, can be reached on (571) 272-1189. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance form a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. M. M./

Examiner, Art Unit 1791

/Philip C Tucker/

Supervisory Patent Examiner, Art Unit 1791